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## ADVANCED MATERIALS

### FRANCE, JAPAN, U.S. IN FIRST FRENCH CARBON FIBER FACTORY

Paris INDUSTRIES ET TECHNIQUES in French 10 Apr 83 p 60

[Article by Alain Perez]

[Text] The first French carbon fiber factory will be located in the Grenoble area. The SEFC [European Fibers and Composites Company] will begin production at the end of this year at Pont de Claix. Two impressive "godparents" are watching as this beginner takes its first steps in a high-tech sector: these companies are PUK [Pechiney-Ugine-Kuhlmann], the leader in aluminum in Europe, and the U.S. firm, Hercules, the leader in carbon fiber, polypropylene, and solid fuels in the United States. The French firm holds 60 percent of the capital in this association. However, the technology and the raw material are coming from another source. A third--Japanese--partner is also taking part in this operation: Sumika, a joint subsidiary of Sumitomo and of Hercules. This is a complex, three-partnered group, working together to produce a material that is no less complex. The acrylic base or precursor fiber (PAN [Polyacrylonitrile]) is Japanese, the carbonization/stretching process is American, and the market is highly promising. The potential clients are companies such as Boeing, Airbus, Dassault, SNIAS [National Industrial Aerospace Company], Lafourcade, and Barland. From aeronautics to sailboards and tennis racquets. Even at a price of 300 francs per kilogram, the advantages of carbon fiber appeal to industry, from the biggest to the smallest companies.

#### As Resistant as Steel

A carbon filament 6 to 7  $\mu\text{m}$  in diameter is obtained by carbonization of PAN. It is as resistant as steel, but 5 times less dense. Bathed in a resin that is usually epoxide, it is an ideal material wherever weight hinders performance. This is true in space, of course, but also at sea, and in a few years, probably in the automobile as well. For the moment, it is primarily a strategic material.

The technology for producing carbon fiber has been available for about 20 years, but the first patents date back to 1880, and to Thomas Edison. Still, it is not a simple procedure. "Even if Hercules had given us the procedure, we wouldn't have been able to produce a single kilogram of fiber." This explains the caution of the SEFC officials. "In the beginning, we will simply follow to the letter what Hercules does in its Salt Lake City plant," said Bruno de Vulpian, P-DG [Chief Executive Officer] of the firm. "Later we will make composites." If everything goes well, carbon fiber "made in Pont de Claix" will begin to be sold during 1984.

The factory is being built on the site of a former Metafram facility. It will employ about 60 people and will operate 7 days a week. It has a production line whose capacity may be doubled later. The total investment is approximately 90 million francs.

Using the precursor, spun PAN (3,000, 6,000, or 12,000 filaments) the manufacturing cycle actually starts with a stretching followed by oxidation at 250°C to stabilize the fiber. Then comes carbonization at 1,500°C in a nitrogen atmosphere. This is a highly sensitive operation which releases prussic acid. At this stage, the filament is almost pure carbon (over 95 percent) crystallized in a hexagonal structure. The fibers are then given a surface treatment which protects them from abrasion and are lubricated which helps them to adhere to a matrix.

On paper, the Grenoble carbon seems to have every possible advantage: a good method integrated with its precursor, solid and experienced allies, the support of the government, and the stimulus of the French aeronautics and space industry. But the market still remains an unknown factor. If all the projects for carbon fiber plants that have been announced actually see the light of day, there will be a surplus production capacity towards 1985. "When we have grown accustomed to thinking of high-performance composites, the applications of carbon fiber will naturally multiply," concluded Bruno de Vulpian.

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## ADVANCED MATERIALS

### BUDGET, GOALS OF PUK VOREPPE LAB FOR ADVANCED ALUMINUM ALLOYS

Paris INDUSTRIES ET TECHNIQUES in French 10 Apr 83 p 6

[Article by Alain Perez]

[Text] Of all the usual metals, aluminum is the least dense ( $2.7 \text{ kg/dm}^3$ ) and the one with the highest energy content (47,000 therms/ton) for first fusion metal. But aluminum is now being threatened by competition from an even lighter material: reinforced plastics in the automobile industry, and high-performance composites in aeronautics. Moreover, most of the new electrolysis plants are now being built in countries with good energy resources. This creates a triple challenge for the PUK [Pechiney-Ugine-Kuhlmann] research center at Voreppe: to find lighter or more resistant alloys, to improve the efficiency of alumina electrolysis, and to simplify the forming of the metal. PUK, the leading European producer and the fourth producer of aluminum in the world, last year spent 200 million francs on research and development on aluminum. That is 1.6 percent of its total sales volume.

The future of aluminum lies in powder metallurgy. The use of this technology can produce compositions that are impossible to achieve through conventional metallurgy. The most promising "alloys" are of the Al-Si, Al-graphite, Al-Li, and Al-Co type. In particular, an aluminum/silicon/graphite alloy is of great interest for parts which undergo friction, in which aluminum is the only one which resists poorly. Cylinder unit casings of this type are now being tested by automobile manufacturers. Also, an aluminum/lithium blend has a specific mass close to  $2 \text{ kg/dm}^3$ . On the subject of the transformation of alumina, the Hall-Heroult process (electrolysis of alumina dissolved in molten cryolite) still remains a very big consumer of electricity. Consumption was 16,000 kWh/ton with 100,000 A vats. It is now 13,000 kWh/t with the use of the 180,000 A vats installed at St Jean de Maurienne. Testing is now in progress with 270,000 A vats.



For forming this material, attempts are being made to simplify the transformation cycle. The Voreppe staff has developed a planetary rolling machine called "Rollcast." This technique makes it possible to roll thick plates directly, thus going directly from a thickness of 100 mm to several millimeters. In addition, the direct casting of liquid metal between cylinders (Jumbo 3C) is now in use in a number of countries.

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BAYER TO EXHIBIT NEW POLYMERS, FEEDSTOCKS AT SHOW

Duesseldorf VDI NACHRICHTEN in German 30 Sep 83 p 24

[Unattributed Article]

[Text] In its innovation center, Bayer AG, Leverkusen, at the K '83, will give visitors to the exhibition a view into the research activities of the enterprise. According to the company, the focus will not be on improvements of already known products but developmental directions will be pointed out that will accent the plastics technology of the future.

In particular, Bayer sees in polymer materials a trend towards the development of higher mechanical and thermal stressability. Polymers with special optical properties will be developed, for example light-collecting plastics. These plastics are called "Lisa" for short, and are capable of considerably increasing the current from photo cells, by fastening the cells at the edge of such a plastic plate. Light which falls on this plate is absorbed in its interior and is converted by the fluorescent dyes within the plate into light of increased, constant wavelength. About 75 percent of this fluorescent light are totally reflected between the plate surfaces. The light can be emitted only at the plate edges and here encounters the photo cells. Electrically conducting polycarbonate films, where the addition of carbon has increased the conductivity by 14 orders of magnitude, that is by 100 billion times, likewise belong among the innovations. Such films can be used as floor heaters, as heating tapestries, and for numerous purposes in electrical engineering.

In contrast to the exhibitors in other areas at their exhibition stands, who are exhibiting finished, ready-to-market products, the innovation center is supposed to present new chemical raw materials to the public, early enough so as to receive suggestions for further development from conversations with interested parties. Accordingly, the new development also will not be presented as a finished product, but the properties of the material will be presented by experiments.

The cauchouc area will present synthetic cauchouc types and cauchouc chemicals as well as applications of these products. In the area of plastics and laquers, new polymer raw materials as well as a large number of applications will be presented, especially technical thermoplastics but also duroplastic chemical materials. A demonstration of plastic lacquering with DD-lacquer will be a central point

## AUTOMOBILE INDUSTRY

### FRG AUTO LAB DEVELOPS BETTER CONDUCTING BATTERY ELECTRODES

Wuerburg ELEKTROTECHNIK in German 7 Apr 83 pp 5-6

[Article: "New Type Electrodes Improve NiCd Batteries"]

[Text] The Hoppecke Carl Zoellner & Son battery factory in Brilon will bring to the market after April 1983 a new generation of NiCd batteries under the designation FNC (Fiber Structure Nicke-Cadmium). The new electrode concept was developed in the research laboratory of the German Automobile Company (Daug), a subsidiary of Daimler-Benz AG and Volkswagen AG. The poorly conducting active mass is laced with good conducting metal fibers. With this characteristic fiber structures it was possible to distribute conductivity of the FNC electrodes better than for the comparable pocket-plate electrode design.

The development of fundamentally new processes for loading the fiber structure with active mass was required for technical realization of the design. All process steps and materials are uniformly applied for all electrode thicknesses (up to 10 mm) and thus for all loading applications. The differentiation of cells in conventional cell construction (sintered foil plates, pocket plates, etc) wherein basic properties have to be varied to suit different loading conditions is no longer required with the new fiber-structure-electrode technology. Also dropping out is the need for conducting additives such as graphite in the active mass, as is common in the case of pocket plates. Graphite oxidizes over a period of time and leads to a distinct loss of capacity. Changing electrolyte after 3 to 4 years in the case of pocket plates is no longer required.

In addition, the new type electrodes prove to be extremely robust. Even after several thousand cycles, no thickness change or damage was found.

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## BIOTECHNOLOGY

### ACTIVITY OF BIOTECHNOLOGY INVESTMENT FUND OUTLINED

Frankfurt EUROPA CHEMIE in German 7 Oct 83 p 492

[Unattributed article]

[Text] The investment fund of the London banking house 'N.M. Rothschild and Sons Ltd has been active for two years in biotechnological installations. It comprises a number of interests. About two thirds of the means of the Biotechnology Investment Fund (BIF), which totals 61 million pounds, have in the meantime been invested. Interests were acquired in 31 enterprises, from large ones down to very small ones, especially in the USA. The magnitude of the investments fluctuates from 1.2 percent in the American Agrigenetics up to 25 percent in the likewise American Advanced Mineral Technologies, which is active in mining and environmental engineering. Only four of the participating companies have in the meantime been listed on a stock exchange. This involves Integrated Genetics (BIF share 4.5 percent), Applied Biosystems (7.4 percent), Amgen (1.6 percent), and Immunex (6.7 percent).

After initial objections, BIF has recently also acquired an interest in the British Celltech. A 4 percent capital share was obtained for 3.1 million pounds. Shares in six other British enterprises are currently being examined. Among these belongs Agricultural Genetics, which was just founded this year by Celltech as its "agricultural leg". Three investors are already participating in this company, the semi-state British Technology Group (BTG) as well as the enterprises Advent and Ultramar. In the USA, expansion of interests in Repligen is being examined, which needs 1 million dollars to construct a fermentation pilot plant.

Two of the BIF investments in the USA, Genetic Systems and Applied Biosystems, have agreed to a joint project which will be concerned with immune diagnostics. Two new diagnostic systems are supposed to be developed, an economical one for application in medical practice and a more expensive one for clinics. Bacterial and virus infections, chronic and cancer diseases, as well as cardiovascular and genetic maladies, are supposed to be detected and diagnosed thereby.

BIF holds 2.5 percent of Genetic Systems and 7.4 percent of Applied Biosystems. The American BIF investment Genzyme (5.6 percent) was founded to take over the British Whatman Biochemicals, which makes diagnostic enzymes.

It has also acquired the likewise British Koch-Light Laboratories, which produces fine chemicals. Genzyme wants to use the two British enterprises as a starting base for developing its biotechnological research.



## BIOTECHNOLOGY

### GERMAN COMMISSION ADDRESSES LAG IN BIOTECHNOLOGY

Frankfurt EUROPA CHEMIE in German 7 Jct 83 p 494

[Unattributed article]

[Text] If one compares the state of biotechnological research in the Federal Republic of Germany with that of other countries, such as the USA, Japan, Great Britain, and Switzerland, one observes a considerable lag in three areas: genetic technology and the genetics of industrially relevant microorganisms, the construction and instrumentation of bioreactors, and the screening of activity-oriented natural substances.

This opinion was reached by a commission convened by the Federal Minister for Research and Technology whose task was to take a position regarding the content, scope, and structure of publicly funded major research in the area of biotechnology.

In a recently presented report, the commission further observed that the lag in the area of genetic technology was recognized in the Federal Republic and various measures have been initiated to improve the situation. On the other hand, the lag in the development of bioreactors supposedly has been recognized only very little and only in part, in the search for new products, i.e. the development of new biotechnological processes. As long as one cannot succeed in finding products and processes that were first developed in the Federal Republic of Germany, a top position will not be reached.

After analyzing the programs and functions of the two major research institutions, the "Society for Biotechnical Research" (GbF) in Braunschweig-Stöckheim, and the "Institute for Biotechnology" (IBT) of the "Nuclear Research Institution at Jülich GmbH", the authors of the study reached the opinion that the originally intended task division between the GbF and the IBT is no longer realistic. Taking into account all the advantages and disadvantages, a unification of the activities in Stöckheim would make sense.

Altogether, the commission deems biotechnology a future-oriented science whose further development will be of extraordinary significance for our economy. The lag in wide areas of biotechnological research in the Federal Republic requires not only increased activities on the part of industry, but also government funding measures both in a large research institution and in genetic technology "centers", special research areas, focal programs, and individual projects. A summary of the report will be published in the next issue of our journal CHEMISCHE INDUSTRIE.

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## BIOTECHNOLOGY

### BIOGEN LEADS INDUSTRY IN INTERFERON PRODUCTION

Paris CHIMIE ACTUALITES in French 26 Sep 83 p 6

/Text/ Biogen N V has begun the first clinical tests of its gamma interferon, used as an anticancer agent. Gamma interferon appeared to be more effective for this use during laboratory experiments than the previously developed alpha interferon. Nevertheless the latter, which had positive effects on certain cancers during clinical tests, will be marketed, and the first authorization for marketing will probably be obtained at the end of 1984. The clinical tests were undertaken with Schering Corp, Biogen's licensee.

The chairman of Biogen expressed satisfaction at having thus anticipated the Genentech firm in the production of gamma interferon by genetic engineering. His company, which up to the present time has been perfecting products for other companies which developed and marketed them under license, is now going to conduct clinical tests alone, and doubtless produce and sell gamma interferon itself. This program would represent an investment of 40 to 50 million dollars over a period of 3 years.

The first injection of gamma interferon was administered to a patient in the Netherlands about 2 weeks ago. Other tests will take place soon in Europe and then in the United States. This experiment constitutes a world "first."

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CSO: 3698/15

## BIOTECHNOLOGY

### BIOGEN BEGINS GAMMA-INTERFERON TESTING

Frankfurt EUROPA CHEMIE in German 7 Oct 83 p 491

[Unattributed article]

[Text] The international biotechnological firm "Biogen NV" is registered in the Dutch Antilles and is active in various countries. It has announced that it has begun first clinical tests on cancer patients using gamma interferon produced by means of the recombinant DNA technology. In a Dutch hospital, the first gamma interferon injection was administered to a patient. As Biogen further reported, this was the first instance in which gamma interferon fabricated by the recombinant DNA technology was administered to a human being. In other European countries, further clinical tests on patients will follow, and in the United States tests are planned for later on this year.

Gamma interferon is the first human medication whose development was carried out completely by Biogen, from the original cloning and expression experiments to pre-clinical and clinical tests, up to production and marketing. For the enterprise, this signifies an important stage in the transition from a research and development company to a production and marketing company. The Biogen chief, Dr. Walter Gilbert, said in this connection: "Gamma interferon, in contrast to alpha interferon, shows significantly greater activity against cancer in laboratory experiments; in some cases, it proved to be 10 to 100 times more active against tumor cells. Furthermore, gamma interferon is a natural protein, which normally is produced by white blood corpuscles in the course of the immune reaction. Therefore it should be significantly safer than many of the presently usual chemotherapeutics."

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## BIOTECHNOLOGY

### SANOFI BEGINS LARGE-SCALE PRODUCTION OF SOMATOCRININE

Paris CHIMIE ACTUALITES in French 26 Sep 83 p 1

/Text/ As the culmination of research conducted by the Montpellier Research Center (formerly Clin-Midy) in collaboration with Professor Roger Guillemin of the Salk Institute, Sanofi is going to begin large-scale production of the cerebral hormone somatocrine, the first therapeutic indication of which is the treatment of certain types of dwarfism. At the end of 1984 production capacity at Marnes-La-Coquette should reach 10 grams per month, while the French demand for this use is about 8 grams per year. This will make it possible to develop clinical tests of what will perhaps be a pharmaceutical specialty before long.

It should be noted that this production, which is part of the joint effort of Sanofi in biotechnology, was made possible by chemical synthesis in liquid phase culminating in the linking of 44 amino acids, one of the long chains of which the Montpellier center has made itself the synthesis champion in recent years.

It should be remembered that the Sanofi-IPP researchers have also succeeded in producing the hormone of human growth by genetic recombination.

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## BIOTECHNOLOGY

### MAX-PLANCK INSTITUTE FOCUS ON BIOTECHNOLOGY

Frankfurt EUROPA CHEMIE in German 13 Apr 83 p 161

[Unattributed article]

[Text] In view of the increasing importance of genetic-engineering methods for the industrial future, the "Max-Planck Society" (MPG) wants to continue its efforts for cooperative projects in this area and wants to increase the funding of growth. The MPG president Reimar Lüst was encouraged in this direction at the most recent session of the senate in Munich, the top decision body. This was reported by the largest non-university research organization in the Federal Republic, which controls an annual budget in excess of 900 million DM.

The MPG wishes to attack the central problem of a lack of qualified scientists by setting up additional groups of young personnel. On the other hand, the conversion of scientific results to practical application, and the application of new methods should be the tasks of industry.

The point here is to make the contact between basic research and industry as close as possible. Scientists and their colleagues in industry should collaborate in institutes, as is already happening in the Max-Planck Institute for Breeding Research in Cologne, and thus should learn about the methods and researches at their early stage.

The representatives of business made it quite clear in the MPG Senate that they were primarily concerned about the learning of new methods. The state agencies for research funding, especially the Federal Ministry for Research and Technology, was requested not to found its own major research institution for genetic engineering.

According to data from the MPG, increased cooperation with industry and the formation of focal points is already delineating itself. For example, in Munich cooperation exists between the Max-Planck Institute for Biochemistry and a group of the University, possibly supported by the "Hoechst AG". Also in Cologne, the Institute for Genetics of the University is collaborating with the Max-Planck Institute for Breeding Research and the "Bayer AG". Also, in Heidelberg, the University is cooperating with the "BASF AG". In Berlin, the senate wants to collaborate with the "Schering AG" to found an Institute for Genetic Engineering in the immediate neighborhood of the Max-Planck Institute for Molecular Genetics in Dahlem.

In numerous Max-Planck Institutes, there furthermore exist working teams which are directly or indirectly concerned with genetic engineering - generally embedded in molecular-biological, molecular-genetic, or biochemical researches. The spectrum extends from Institutes for Biochemistry in Martinsried, for Biology in Tübingen, through Institutes for Immunobiology in Freiburg, for Experimental Medicine in Göttingen, and for Virus Research in Tübingen, up to the Institutes for Cell Biology in Ladenburg, for Biophysical Chemistry in Göttingen, and to the already above-mentioned research institutions.

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## BIOTECHNOLOGY

### GERMAN STATE UNIVERSITY-BUSINESS INITIATIVE IN BERLIN

Frankfurt EUROPA CHEMIE in German 7 Oct 83 p 492

[Unattributed article]

[Text] The Berlin Senate has now officially given the "green light" to the planned Institute of Cell Biology (we reported extensively concerning this in a conversation with Dr. Herbert Asmis, member of the Board of Schering Company, in our August issue of the journal CHEMISCHE INDUSTRIE, p 429). The Berlin Senator for Science and Research has transmitted to the House of Delegates a bill for decision, according to which the Province of Berlin jointly with the 'Schering AG' is supposed to participate in such an institute. Beginning in 1984, a new structure will be erected on the land of the Max Planck Institute for Molecular Genetics in Berlin-Dahlem. Here, mainly basic research in the area of cell biology and the investigation of the application of genetic engineering methods will be carried on. Our report of the above discussion gives all the particulars.

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## BIOTECHNOLOGY

### BRIEFS

**NOVO EXPANDING WORLDWIDE INSULIN MARKET**--The American marketing authorization of Novo human insulin by the FDA [Food and Drug Administration] granted last 30 August (p 5 of our previous edition) brings to 10 the number of countries in which the use of this product is now authorized. It is actually already being sold in Ireland, the Federal Republic of Germany, the Netherlands, Denmark, Sweden, Switzerland, Luxemburg, Malta, and Malaysia. Sold in the United States by Squibb-Novo, a joint subsidiary which began operations in May 1982, the insulin is available in two formulae--Actrapid and Monotard. [Text] [Paris CHIMIE ACTUALITES in French 12 Sep 83 p 7] 6108

**DECHEMA CONFERENCE IN MUNICH**--Berlin, 13 Oct--With the support of the European Federation of Biotechnology and the member societies of the "Working Community in Biotechnology", the "German Society for Chemical Apparatus" DECHEMA organized the Third European Congress on Biotechnology. It will take place from 10-14 September 1984 at Munich Technical University. Besides the primary lectures, there will be reports for looking ahead and for looking back, survey reports, and poster displays, especially seminars concerning future aspects, podium discussion, workshops, film presentations and exhibits by companies. The language of the Congress is English. Applications for papers are requested until 1 September 1983. Call for papers: DECHEMA Congress Secretariat, P.O. Box 97 01 64, D-6000 Frankfurt 97, Telex: dcha d 412 490, Telephone: 06 11-75 64/2 41. [Text] [Frankfurt EUROPA CHEMIE in German 13 Apr p 160] 8398

CSO: 3698/46



## CIVIL AVIATION

### FRG DECIDES ON FURTHER FINANCIAL SUPPORT FOR AIRBUS

Munich SUEDEUTSCHE ZEITUNG in German 5 Oct 83 p 25

[Text] Bonn.-On Tuesday, the Cabinet announced its basic willingness for further financial support of the Airbus program. Among the measures agreed to by the Federal Government are limited-repayment development-cost loans for the A-310 project, a DM 400 million increase in the loan guarantee for serial production, conditional financial participation in development costs of the model A 320 and finally a promise to take over a larger share of export financing from Airbus Industries in specific cases.

By its decision, the Cabinet underlined the continuing importance of the Airbus program to the future of the German aeronautics and space industry. The Federal Government is thus also ready, within the scope of its limited budget, to financially support the future participation of German industry in the expansion of the Airbus family. However, in this connection, the Cabinet called attention to the basic agreement of the administration of Helmut Schmidt of the spring of 1982. At that time Bonn had hinged financial participation in further development of the European wide-body aircraft on a demonstration by the Airbus consortium of the profit-ability of each new project and on greater financial participation by the consortium. Also the Kohl administration expects the industry to present a plan for limiting the overall risk which in the area of the series-production loan guarantee is said to be reaching "almost to the limit of what is reasonable."

However, the Government is delaying a final decision concerning support of the new A-320 model until such time as the industry itself decides on a start up date for the project. Independent of this, Bonn is ready to advance a new one-time limited-repayment loan in the amount of DM 12 million toward the costs of prephase work for the A-320. Stipulations for this are a satisfactory projection of near-term orders plus an updated overall projection of long-term market changes. In particular, the Bonn Cabinet agreement provides for the following detailed measures:

-- For the A-310 improvement program, limited-repayment loans up to the level of DM 238 million are provided for partial financing of the German portion of development costs for fiscal years through 1987. Planning for the overall A300/A310 program through 860 aircraft through 1994 with associated production planning is authorized. The postponement of repayment of the development-cost loan which was agreed to in March of last year is being extended by 2 years until 1994.

-- The series production loan will be currently increased to DM 4.1 billion and increased in the future to DM 4.5 billion in recognition of the increasing difficulty in selling the Airbus in the world market. With regard to the release of the individual manufacturing lots and ordering of materials with long-term delivery dates, the minister of economics in concurrence with the minister of finance shall decide at the required time in each individual case.

-- The self-cost reimbursement system with upper limits presently used will be replaced by a new compensation system. The Government intends for Airbus and MBB to be taking initial steps now for introducing a fixed-price system, especially in view of the pending decisions concerning the expansion of the Airbus family.

-- In guaranteeing export loans, the Government will take into account in the future even more strongly the special technology and employment policy interests linked with stronger support of Airbus exports and in specific cases will consider taking a higher risk through improved export loan packages. Along with the above, the ministers of economics and finance were commissioned by the Cabinet to act in concert with industry to investigate new financial models for limiting the reliance on the Federal budget in the construction of future Airbus aircraft.

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## CIVIL AVIATION

### DESIGN FEATURES OF FRANCO-ITALIAN ATR 42

Rome AVIAZIONE in Italian Sep 83 pp 506, 559

[Article from English section of publication by D. Mesturino]

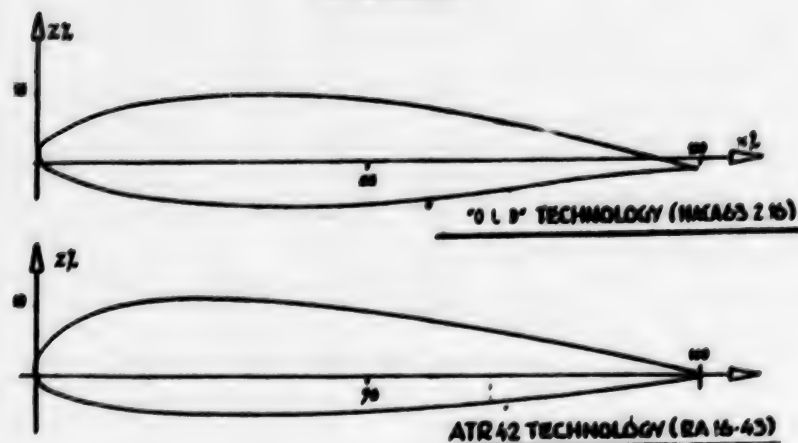
[Excerpt] Born of a synthesis of two European designs, Aeritalia's AIT 230 and Aérospatiale's AS 35, the ATR 42 is Europe's answer to local transport needs with a plane satisfying both passenger and airline requirements. As a matter of fact, its capacious fuselage offering a clearance inside the furnished airplane of 1.90 meters (6'4") and a width of 2.265 meters (7'6") makes it the most spacious of the new generation aircraft. Furthermore, placement of engines with respect to the fuselage and use of large propeller blades has greatly cut down the noise level in the plane. The ATR 42 offers a synthesis of the technological experience the two firms have accumulated through the years. Aeritalia, which built the fuselage and the tail planes has made wide use of composites. Important parts such as the leading wing and elevator edges, the fairing of the engines and landing gear and the entire floor of the passenger compartment are in Kevlar. Control surfaces including flaps are in graphite, leaving only the pressurized part of the cabin and wing structure in light-weight aluminium alloys. Such design techniques have made possible a considerable reduction in the plane's empty weight and increased its commercial load capacity, given the same dimensions. In its design, Aérospatiale cut sophistication of hydraulic systems in control surfaces to a minimum. The latter are moved by prestressed steel cables without addition of any hydraulic sophistication for sensitivity, while flaps and landing gear are linked to a double hydraulic system to ensure their efficiency. The plane can nevertheless land without flaps on a slightly longer runway. Landing gear comes down under the force of gravity. The aircraft is pressurized creating a differential pressure of 6.1 PSI at an altitude of 25,000 ft. Research carried out by the two companies has resulted in the airplane's advanced aerodynamic characteristics, such as wing construction applying a number of principles derived from supercritical profile experimentation. The wing's profile is, in fact, extremely non-conventional presenting a thick section at the front of the wing with a considerable increase at the top of the chord and a flattening out of the back of the wing. Thus, the entire wing chord is contained within the wing section. Considerable work has also been dedicated to the construction of the flaps. Their twin-slot modular structure offers remarkable aerodynamic characteristics both during take-off and landing. The wing profile's technological combination makes for excellent take-offs and landings on 1000 meter runways without the cost of STOL certification. Instrumentation for flight control is very advanced. Manufacturers have realised that local transport is only feasible in Europe today if operated with the same flight minimums as large airlines. Control of the airplane's altitude and heading is given by means of two strap-down digital bar gyroscopes. They offer extremely high stability to instruments linked to them, whether they be electromechanical ADI and HSI or CRT displays. Low visibility operation instruments are topped off by an autopilot offering CAT II operations which, given the advanced technological structures of the cockpit, can, with minor alterations, be augmented to include CAT IIIA operations. Due to the adverse

weather conditions in which the plane is expected to fly, because of the average short flight length, it is equipped with an excellent flat antenna serving a third generation weather radar, giving precise weather displays under all flying conditions. The ATR 42 has

two high bypass ratio P&W turboprop engines with approximately 1800 hp at the output shaft and a high reduction rate at the propeller shaft, making installation of a special large diameter propeller possible, optimising the engine's efficiency.

#### WING AIRFOIL PROFILE

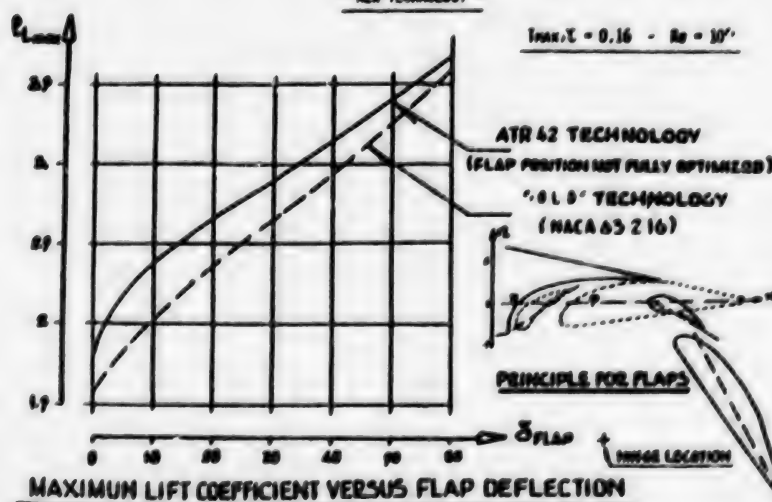
- NEW TECHNOLOGY -



#### COMPARISON OF AIRFOILS DESIGNS

#### FLAP SYSTEM

- NEW TECHNOLOGY -



## COMPUTERS

### ERICSSON TAKES OVER FRG COMPUTER FIRM, NEW MARKET OPENS

Frankfurt/Main/FRANKFURTER ZEITUNG/BLICK DURCH DIE WISSENSCHAFT in German 3 Oct 83  
p 7

[Unattributed article]

[Text] During the summer months, Ericsson Information Systems GMBH, Düsseldorf, has raised quite a stir by taking over the ailing German manufacturer David Computer System GMBH. With the new member in the Ericsson group, the Swedish company now covers all computer performance stages, according to its own statements, from personal computers to office computers to minicomputers. In the Federal Republic, various products such as writing systems, computer peripherals, telephone systems, security systems, or equipment for the acquisition of operating data as well as Ericsson networks are being offered.

The take-over of David Computer as a 100 percent subsidiary of Ericsson is regarded by the enterprise as a strategically important step. On the one hand, the product spectrum is supposed to fit well into the Ericsson line, on the other hand, David Computer controls a qualitatively good and widely spread dealer network. Furthermore, the 3000 computer installations of the German enterprise form a market for other products by Ericsson.

David Computer Systems GMBH, according to its own statements, got into difficulties because of the lack of stock capital and growing interest burdens. Because a short-term profit was no longer possible, 60 banks withdrew their trust from the enterprise. Undoubtedly, the delay in the delivery of the "9445 chips" from the American enterprise Fairchild was also responsible for the economic condition of David Computer. Fairchild stabilized in a few "free" suppliers of 16-bit microprocessors.

Despite this miserable condition, the Swedish EDP concern decided to integrate the enterprise into the Ericsson group. The group was sold in 1982 for a total of 112 million DM, of which 62 million came from the marketing of data processing products, 22.2 million from office automation, and 27.8 million from the area of communication products. For 1983, the group set a sales goal of 200 million DM for the Federal Republic. Of this, 150 million DM should come from the Ericsson Information Systems (nearly 90 million DM presumably for data processing products), and 20 million DM still from David Computer Systems. In the coming year, David Computer should double its sales contribution to 40 million DM, while a sales contribution of 230 million (an increase of 53 percent) is expected from Ericsson.



Beginning in October, the new IBM-compatible personal computer by Ericsson, Step 1, is to be delivered to the public. The modular 16-bit computer with 128 Kb ram/16-Mb ROM is supposed to have available a 12 inch display screen, a keyboard, as well as connection capabilities for a broad spectrum of peripheral units. Furthermore, the computer is supposed to be useable as a terminal for the minicomputer system 2500. Step 1 will be supported by the operating systems MS-DOS and CP/M-86. Furthermore, as interpreters and as compiler, BASIC-86 and the expanded Basica are supposed to be available. Through the IBM 3780 and 3270 (BSC) simulators, data transmission from Microsoft and Micropro, including also Multiplan, will be taken over under license. Furthermore, software for all "classical administrative" tasks will be offered. New applications, for example with the display screen text and teletex service of the German Post Office, will be dealt with by Ericsson with appropriate versions of the personal computer Step 1.

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## COMPUTERS

### FRG'S NIXDORF INCREASES REVENUE, PLANS INVESTMENT, EXPANSION

Duesseldorf HANDELSBLATT in German 18 Oct 83 p 14

#### [Unattributed Article]

[During the first three quarters of the current 1983, Nixdorf Computer AG, Paderborn, has created over 1,000 new jobs and has thus increased the number of its employees to 17,000.

Nixdorf recorded a lively demand both domestically and abroad, which led to a 25 percent plus in orders received and to a 20 percent sales expansion during the first three quarters, as was stated by the member of the board Arno Bohn, who is responsible for marketing, at the occasion of the '83 system. Profits also developed positively.

Especially lively is supposed to be the demand from fiscal institutes both domestically and abroad. Here, Nixdorf increasingly assumes major projects, such as the equipment of complex branch networks. Thus, the Svenska commercial banks, Stockholm, will be equipped with Nixdorf units for its countrywide network of branches. For the Paderborn company, this implies a contract volume of about 50 million DM.

The business with medium clients is also supposed to be going well, especially since an extensive range of software can be offered to this group of users. Altogether, Nixdorf intends to produce 82,000 computer work stations during this year. Since a sales growth of 18 to 20 percent is again expected, the entire business volume should reach about 2.7 to 2.8 billion DM (1982: 2.28).

Just as in the previous year, so also in 1983 Nixdorf will again invest about 280 million DM. Thus, several new computer houses are to be erected within the framework of a long-term investment program. At this time, computer houses are being built in Hannover and Munich. The construction preparations for Dortmund and Essen have in the meantime started up, and the foundation has already been laid for Lyon.

Further construction plans exist for Vianen in Holland and London. Furthermore, the capacity in Paderborn is being expanded, and a new plant for peripheral production is being built in Cologne. In Berlin, the local production is being supplemented by the manufacture of plastic parts.

In the meantime, Nixdorf offers a broad spectrum of office computers, beginning at a price of 10,000 and up to 300,000 DM. The microcomputer production, which was started after the Hannover exhibition, is not quite keeping step with demand, because the starting capacities proved to be too small. Within the framework of the product family 8860, Nixdorf presented a new microcomputer on the system '83. With the name Micro 4, this computer has already been released for marketing.

#### Major Order for Over 1100 Computers

At the same time, Nixdorf announced another microcomputer of this family, but this will be released for marketing only in the second quarter of 1984. A skeleton contract concerning the delivery of over 1100 Nixdorf computer cash registers 8812 was recently signed by the foodstuff retail group Nanz in Stuttgart, which has its headquarters in South Germany. It wants to equip 82 branches with this computer system. The value of the contract exceeds 30 million DM.

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## COMPUTERS

### SIEMENS' DATA TECHNOLOGY BRANCH BECOMES PROFITABLE

Duesseldorf HANDELSBLATT in German 18 Oct 83 p 14

#### /Unattributed Article/

/Text/ During the past business year 1982/83 (30 September), the business area of data technology of Siemens AG, Berlin/Munich, could for the first time in years again be brought into the profit zone.

This was stated by the general authorized agent, Director Dr. Reinhard Veelken, at the occasion of the Munich System 83. Final figures are not available, but orders received and sales grew by more than 10 percent. Thus, the sales of the business branch of data technology should lie above 2.2 (2) billion DM. Including internal sales, the total business volume approximates more than 2.5 (2.3) billion DM.

For the eighties, the concept of Distributed Data Processing (DDP) has established itself. Up to now, over 1800 systems 7500/bs 2000 were installed with the customers. If one adds to this the computers of the System 7700 which run below bs 2000, Siemens can point to more than 2000 installations of the operating system bs 2000.

Through a study by a consulting enterprise, the largest German electrical concern could demonstrate that the expenditure for operating with the bs 2000 is much less than with the main operating system of its major competitor IBM. The bs 2000 is supposed to be 30 percent to 40 percent more economical as regards the factors of EDP budget, expenditure in system maintenance, personnel in the computer center, annual training expenditure for data processing employees.

The trademark symbol of the Siemens hardware and software products for communication between computers and terminal units and for communication between computers among one another is called Transdata. The fraction of Transdata in the EDP business of Siemens at this time is about 30 percent and will increase further, as Veelken stated. At the occasion of the Systems 83, Siemens presented a new multi-application work-station computer "Transdata" 9780.

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## COMPUTERS

### COMPUTER RESEARCH, INDUSTRIAL TIES OF FRG'S GMD

Munich COMPUTERWOCHE in German 1 Jul 83 p 4

/Text/ GMD /Company for Mathematics and Data Processing/ of St Augustin near Bonn used the occasion of the installation of new computer systems IBM 3083 and Siemens 7.571 to present an outline concept of its future operations. According to GMD board member Friedrich Winkelhagen, these will focus on "the issue of integration." At the same time the company will restructure its operations to make them more flexible, while restricting the build-up of administrative departments to the essentials.

Winkelhagen says that the integration aspect involves both technical integration and the integration of technical infrastructures in organizations as well as technical and organizational links between organizations at national and international level. Even more than in the past GMD intends to emphasize cooperation with industry. Winkelhagen hopes that other manufacturers will become partners, in addition to IBM and Siemens. At the present time GMD is carrying on quite promising negotiations with Triumph-Adler, Nixdorf and Kienzle.

The "concept of future developments for GMD" provides for three instead of the present ten research institutes and for two central institutes. Research institute I will occupy with the topic "basic methodological issues." These include mathematical and informational methods for the construction, organization and utilization of information systems as well as the topic "artificial intelligence."

The key issue for the work of research institute II will be "systems technology." To be studied is the architecture of information systems as seen in their appliance network and software. Projection aids for the design of VLSI's are to represent the bridge with basic equipment. Existing approaches to software production environments, languages of more recent generations and the corresponding compilers as well as software for personal computers in cooperative user environments and linked to dedicated service computers are to be appropriately expanded.

Research institute III--"application systems"--will concert the earlier work of GMD in the fields office systems and decisionmaking systems. This institute will also conduct studies on man-machine communication and knowledge-based systems.

Central institute I will occupy with the topic "integrated infrastructure--construction and operation." Envisaged here is primarily an even greater emphasis on communication techniques. In addition to the traditional services, the research and



development element is to be further expanded. In Winkelhage's words, it is to "test future information and communication infrastructures in the manner of a pilot enterprise."

Lastly, central institute II will take on inter-institute tasks relating to the transfer and implementation of information technology. At the suggestion of the Federal Ministry of the Interior, GMD will emphasize further data processing training in the public sector. Particular attention will be devoted to the standardization of higher communication records and the nonconformity testing of magnetic tapes and diskettes.

GMD's Erich Kammerer underlined that, on the whole, concepts such as restructuring serve to analyze the following foreseeable trends and engage in the appropriate operations:

- Future applications will be based on linked infrastructures from centralized and decentralized components;
- This linkage must build on a standardized technical communication infrastructure;
- The user must be offered a high-level interface that may be "custom tailored";
- The location of the actual (data structure) processing must depend on (entirely) economic aspects.

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BRIEFS

ERICSSON INFORMATION SYSTEMS REVENUE--Some time ago the L.M. Ericsson Corporation completed its takeover of Facit AB; the same step has now been taken by its Swiss subsidiary. In future Ericsson Information Systems AG, Zollikon, will handle the administration and sales of Facit products such as display terminals, printers, word processors and other office equipment. In 1982 Ericsson Information Systems AG recorded an excellent year--turnover was 9.9 million Swiss francs. This corresponds to a per capita turnover of 580,000 Swiss francs, well above the average for the industry. The Alfaskop display terminal systems did particularly well. Ericsson expects a successful result in 1983 also, all the more since 70 percent of the annual sales projection had been achieved by the end of May, although it had been set 40 percent higher than last year. /Text/ /Munich COMPUTERWOCHE in German 1 Jul 83 p 10/ 11698

ERICSSON BUYS FRG FIRM--As of 1 July, Ericsson Information Systems GmbH /company with limited liability/ will take over all operations of the Stuttgart David Computer GmbH. This was confirmed by Ericsson general manager Magnus Falk. The new subsidiary of the Duesseldorf firm will be known by the name "David Computer Systems GmbH"; Michael Lanik will stay on as general manager. According to Falk, Ericsson will continue to cooperate with David dealers. /Text/ /Munich COMPUTERWOCHE in German 1 Jul 83 p 4/ 11698

COMPUTER MARKET GROWTH IN ITALY--According to the experts, the Italian computer market will develop more rapidly during the next years than in most other Western industrial countries. In the eighties the Italians expect annual growth rates of 42 percent, as compared to 28 percent in the USA. The reason for this growth, according to the government software specialty firm Italsiel, lied especially in Italy being a latecomer in the computer market: While in the USA there is already one computer terminal per 41 inhabitants, in Italy there are statistically still 612 inhabitants for every computer. During the past year, computer sales in Italy amounted to about 6560 billion lire with a real increase of 12 percent compared to the previous year. In the future, this branch expects strong growth, especially also in the area of personal computers. The largest Italian manufacturer is Olivetti, and the largest market supplier is IBM. /Text/ /Munich COMPUTERWOCHE in German 8 Jul 83 p 44/ 8348

## FACTORY AUTOMATION

### FRENCH FIRM HAS NEW POLYAMIDE POWDER FOR INDUSTRIAL USE

Paris INDUSTRIES ET TECHNIQUES in French 1 Apr 83 p 78

[Article by Alain Perez: "Ultra-Fine Polyamide Powders"]

[Excerpt] By Chemical Means

Ato Chimie is now marketing a new generation of polyamide powders. They are produced directly by chemical means. Due to this technology they have achieved a minimum diameter of 10  $\mu\text{m}$ , the form of the particles is ppheroidal and the product is porous. In addition the standard deviation of the distribution curve of the diameters is clearly improved.

These powders, baptized "Orgasol," are available in polyamide 6 (fusion point 215°C), polyamide 12 (175°C) and two types of copolymers 6/12 (135-160°C and 185°C). They exist in white and natural color in three grades: 10  $\mu\text{m}$  (Exd), 20  $\mu\text{m}$  (D) and 45  $\mu\text{m}$  for electrostatic painting. For each nominal diameter, the manufacturer guarantees 80 percent of the particles to fall within 10  $\mu\text{m}$  above or below that diameter.

These reduced diameters make possible a proportional reduction of the thickness of the protective film, which is perceptibly equal to the diameter of the particles. The coating thus becomes practically invisible to the naked eye. In the case of paint jobs baked in the oven, the powder deposit liquifies during the baking. Upon chilling, it is transformed into an uninterrupted film. This "web" effect thus creates a real plastic skeleton within the layer of paint. In addition the microporosity of the material brings with it another advantage: the absorption of the solvent. Thus these powders absorb 40 percent and still remain impalpable.

The immediate applications lie in the traditional protection of metal and glass: coil coating, packaging, glass containers, and the anticorrosion layer beneath automobile pain. In cosmetics, the clearest interest lies in the "softness" of the powder, the result of the size and shape of the particles. This product could be substituted for talc. Another potential application: the manufacture of composite glass reinforcing materials. In this case the polyamide matrix is deposited by electrostatic means on glass fibers. According to this principle a ribbon containing 60-65 percent fiber and 30-35 percent polyamide has been achieved. Baptized "Bolduc," this material is especially designed to reinforce pipes. A composite external collar is thus wrapped around the metallic framework.

## FACTORY AUTOMATION

### ASEA ENTERS MARKET FOR ASSEMBLY ROBOTS

Frankfurt/Main/FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 27 Sep 83  
p 5

[Unattributed Article]

[Text] At the SITEV, which was held in Geneva in the beginning of June, the Swedish ASEA presented the industrial robot IRB 6/2 in an assembly process. This was the first indication that the enterprise is now also active in the market of assembly robots.

The robot demonstrated how it inserts screws into the transmission housing of an engine block. The screws are automatically fed from a magazine through a hose to the pneumatic screwdriver at the gripper tool of the robot arm. During the demonstration, the robot subsequently again loosened the screw connections. As the ASEA remarked in this connection, this involves an application similar to the one planned for the Saab-Scania in the Swedish Sodertalje. In this installation, an IrB /60 robot furthermore mounted a flywheel onto the crankshaft of an engine block. As an accessory, the enterprise will offer a number of tools and assembly aids for the robot arm, including the screwdriver and the magazine. In addition, a mobile magazine with an integrated gripper tool can be delivered. The parts to be mounted are transmitted step-by-step, until they are gripped by the gripper at the beginning of each insertion process. In the short pause between the assembly cycles, the robot runs to a loading station and fills the magazine with newly supplied parts. This unit has already proven itself in the installation of valve springs and spacer shims in the cylinder head of automobile engines.

A third device is a multiple gripper for installing different parts, if take-up of these parts sequentially is not possible for time reasons. The gripper consists of six pairs of fingers, which work independently of one another, and which are matched to the different parts. This gripper has already been used in the assembly of switching contactors, where one robot stands on the floor while the other was arranged suspended.

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## FACTORY AUTOMATION

### SIEMENS INFORMATION SYSTEM FOR FLEXIBLE MANUFACTURING

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German  
12 Oct 83 p 5

[Article: "Stepwise Build-up to Manufacturing System"]

[Text] Siemens AG, Munich. Stepwise build-up of flexible manufacturing systems (FMS) is possible with modular automation components. The hierarchical information system used for this consists of stand-alone control components, a data transfer system and a process-control computer as the central control and monitoring unit for the total installation. The process-control computer of the Siemens System 300 plans in detail and monitors the execution of production orders. The MMC- 216 multi-microcomputer and Simatic memory-programmable controls coordinate and control material flow. Siemens' numerical controls operate the machine tools and robot controls run the industrial robots. In addition to the hardware, one can obtain from Siemens as a single source also the software, planning and engineering for flexible manufacturing systems. The hardware and software tools are tailorable to the specific tasks and contain the necessary interfaces for system expansions and integration into CAD/CAM systems. The primary user of Siemens' modular automation components for FMS is the machine-tool industry.

As control computers for the central-control and monitoring system for flexible manufacturing systems, Siemens' System 300 microcomputers are used. Main memory is expandable from 256 KB to 2 MB and the computer can be equipped with the required standard peripherals such as disk storage units, black and white or color monitors, and work-station terminals. The system software includes the real-time ORG 300 operating system, the DVS 300 data management system and the Sinec 300 communication system. For setting up user software, compilers are available for COBOL, FORTRAN, BASIC, and PASCAL. For solving the problems queued up in connection with FMS's, standard modules are available for planning, control, and monitoring functions.

The MMC-216 multimicrocomputer system serves as a data transfer system and compressor between the control computer and the machine controls. It consists of processing, storage and communication units which can be connected to form a single or multiprocessor system. The microcomputer



has fifteen serial interfaces for connecting machine controls; and its freely programmable feature allows it to adapt to a particular machine-tool-controller interface.

The stand-alone Sinumeric System 8 provides a comfortable DNC interface for linking a machine tool to a process control computer. With the Simatic-S5 PC integrated in the Sinumeric 8, a machine's interfacing equipment such as pallet changers and tool magazines can be monitored and controlled. The Simatic S5 is also used as a stand-alone unit for controlling material flow. Using adapter AS512, it provides a serial interface to a process control computer. In the application of industrial robots for parts and tool handling, the RCM 1 and RCM 2 robot control units are available from Siemens. Both have serial interfaces, and the RCM 2 also has a DNC interface. All controls have a program storage unit, a connector for a program loading unit and an input keyboard for hand operation. The latter makes it possible to bring an installation up to operating condition stepwise, and it assures that a unit can be decoupled from the overall information system--for tests, for example--and operated alone.

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## FACTORY AUTOMATION

### KUKA'S AUGSBURG ROBOT FACTORY DOUBLES REVENUE

Dusseldorf WIRTSCHAFTSWOCHE in German 14 Oct 83 p 115

[Text] In 1971 the Augsburg Kuka GmbH [company with limited liability] delivered a welding transfer line to Daimler-Benz. This was the first of its kind to be equipped with U.S. robots. At that time Kuka began to think that it should itself produce robots. The astute Swabians took the risk of embarking on a synthesis of conventional techniques and forward looking microelectronics.

At the present time Kuka is second only to Volkswagen Werk as a producer of industrial robots. It will soon dispatch its thousandth welding and assembly aid to the world of work. Kuka Schweissanlagen und Roboter GmbH [Kuka Welding Plant and Robots] turned over DM221 million in its Augsburg factory alone. DM72 of this total were generated by the robot product group--representing a doubling of turnover by comparison with 1981.

The boom about to begin was barely visible on the horizon in 1978, when the first series of robots--the IR 601--came off the production line, following several years of development work; currently the third generation of the silent hard worker is in production. All European industrial countries and even the United States, the great innovator, now place orders with the Swabian inventors; every third robot unit goes abroad. Ninety percent of Kuka systems are at work in the automobile industry; they may be found at BMW and Ford, Alfa Romeo and British Leyland. Quite recently output had to be increased from 1½ to 2 robots per day.

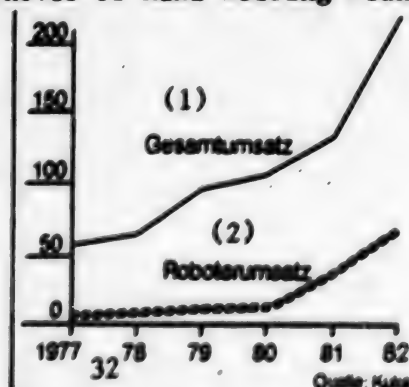
Robot production has turned into an independent section of the welding line producer. It employs 200 staff--almost evenly distributed in the departments research, manufacture, assembly, sales and service. Staff training and a high percentage (7 percent) of spending on development allow Kuka to expect to keep ahead in future also. According to robot development manager Heinz Woern, complex control systems, more robust sensors and the direct linkage of robots to systems for computer backed design and manufacture are next on the Kuka development program.

Graph--Upward Trend--Development of Turnover of Kuka Welding Plant and Robots GmbH, Augsburg Works, in million DM

Key:

- 1. Total turnover
- 2. Robot turnover

Source: Kuka



## FACTORY AUTOMATION

### OUTLOOK FOR REVENUE IN SIEMENS' AUTOMATION TECHNOLOGY BRANCH

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 25 Oct 83 p 15

[Report by GM, datelined Erlangen: "Automation Technology is the 'Sale of Competitive Capacity'"]

[Text] For an electrical engineering firm handling automation issues it seems appropriate for it to commit itself to the robot market. That holds true in particular for the electronic control components of this special type of operational devices. With the Erlangen products of its specially established robot subsidiary, "Mantec Gesellschaft fuer Automatisierungs- und Handhabungssysteme mbH"/Mantec Company for Automation and Operation Systems mbH/, of Berlin (ordinary capital DM2 million), Siemens is the supplier of the leading German robot producer, Kuka of Augsburg. At the same time Mantec developed its own robot, albeit it is far smaller than the robots produced by Kuka. Mantec's intention to expand the range for specific assembly tasks is also directed only to complement the program downward. Up to now orders for the Mantec robot have amounted to DM2 million. The total receipt of orders by Mantec GmbH rose from DM5 million to DM10 million in the past financial year, and another 100 percent increase--to about DM20 million--is expected this year. Siemens believes an expansion of about 30 percent annually in the next 10 years will happen on the West German robot market that, at currently 3,500 robots, is well behind the United States (9,000) and Japan (12,000), though enjoying a 50 percent growth rate. The electrical engineering corporation considers the key of its future development work to be the further development and integration of the "sensor principles"--seeing, feeling and hearing.

In Erlangen, a medium-sized Franconian city, the energy and automation technology works of Siemens AG represent the largest industrial complex. It is also relatively safe from crises, although the labor force of 77,000 worldwide does tend to decline. Still, the second largest section of the Siemens corporation, providing about a fourth of the German electrical engineering giant's international turnover, not only yields above average earnings, it also spells growth. This was the case with a 9 percent average annual growth rate in the past 10 years and is expected to continue with about 6.7 percent in the years to come.

These expectations of growth are based mainly on automation technology. Holding an almost 30 percent share in total turnover, it still lags behind general energy technological products and plant for energy supply and traffic, public and industrial customers. However, its impact is growing. In 1970/1971 it only held 19 percent. In this field Siemens does not depend as much on market fluctuations as in energy technology. Indeed, it may well hope for the impetus given by time. The sale of automation technology is "the sale of competitive capacity," says Siemens. The firm therefore expects progress to speed up, at least as far as Siemens is concerned. While automation technology has gained an annual average of 13 percent since 1970/1971, the coming years are reckoned to bring 15 percent advances.

At a turnover volume now exceeding DM3 billion, Siemens is able to operate from a position of strength, especially in the FRG. To cite a comparison: The German market for automation technology, achieving between DM5.7 billion and DM6.6 billion in 1981, is to expand to DM9.4 billion to DM11.6 billion by 1985. Internationally also Siemens is among the leading suppliers in this field. The firm boasts of its dominant role in power plant and rolling mill automation. Certainly in the field of power plant automation the firm considers itself second only to the United States on the world market. In the current financial year the firm expects control equipment for power plants to achieve an increase in orders received from DM600 million to about DM750 million.

That is a highly unusual growth rate in the sector of process automation, in other words the control, regulation and optimization of technical processes and procedures. In this particular sector Siemens is thinking in terms of 8 percent annual growth in the next 5 years in the Federal Republic (current volume around DM3 billion). On the other hand, Hans Guenter Vogelsang, executive board member of Siemens AG and head of the energy and automation technology section (already a slightly larger market sector of process automation) foresees growth to run between 15-18 percent. This is closely linked with the development of electronics -- increasingly important for the automated manufacture and processing of products. It points to the "factory of the future," or--in the vernacular--the "ghost factory," smoothes the way from rigid to flexible automation and, therefore, the significant market potential of medium and small enterprises. The largest German electrical engineering corporation firmly intends to be involved. To cite an example: By supplying 45 computers inside the works and 40 outside, in the sale organization, and the continuing electronic equipment of a flexible automation system, Siemens has helped the BMW Munich plant to operate in such a way that each of the 800 series 3 cars rolling off the assembly line each day could represent one of 30,000 possible variations--if it so chose.

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CSO: 3698/70



SIEMENS DEVELOPS HIGHLY SENSITIVE PRESSURE SENSOR

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German  
14 Oct 83 p 5

[Unattributed Article]

[Text] The enterprise is currently working on the development of pressure sensors, whose working ranges far exceed the present standard values of 2 bar (KPY 10/12) and 10 bar (KPY 14/16). These components can now also be used in pneumatically activated industrial robots (50 bar) or in hydraulically moved construction machines (400 bar). By the end of this year, there will presumably also be measurement cells for 50 millibar (filling level of washing machines) and for less than 40 millibar, or at least so Siemens hopes.

According to representations by the enterprise, a thin silicon diaphragm is common to all the pressure sensors. This diaphragm bends under the "pressure" of the measured quantity. By means of the diaphragm, resistors applied thereon are deformed. By means of the piezo-electric effect, they convert the mechanical stress into electrical signals. At a 5 volt bridge voltage, 100 millivolts are thus obtained from 2 bar. The edge lengths of the square silicon chips are 4 millimeters (KPY 10/12) and 3 millimeters (KPY 14/16). For high-pressure sensors, edge lengths of 5 millimeters are provided. With an unchanged bridge voltage (5 volts), the respective maximum pressure of 60, 160, or 400 bar leads to output signals of about 200 millivolts. Siemens especially stresses the linearity of the characteristic for the ratio of pressure and output voltage. The characteristic error is about 0.2 percent for 160 bar and 0.5 percent up to 400 bar, and does not exceed this value.

Still larger silicon chips are used by Siemens, according to its own statements, for the low-pressure sensors. For less than 40 millibar, it uses an edge length of 8 millimeters. In place of a circular diaphragm etched along its entire surface, an annular diaphragm is disposed on this chip, so as to keep the characteristic error within limits. Further limits of the measurement range are 100 millibar, 150 millibar, and 600 millibar.

As Siemens reports, the new sensors can already convert pressure values into electrical signals in such ranges as were previously inaccessible to this elegant method. Pneumatic and hydraulic high pressures up to 400 bar can be measured just as well as blood pressure (200 millibar) or the filling level of



a vacuum cleaner filter (100 millibar). The pressure sensors with a silicon diaphragm are also suitable for the free atmosphere: Soon, barometers will become available cheaply, whose pressure-sensitive point no longer is a diaphragm-can, but a silicon membrane on a small chip, according to the opinion of Siemens.

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## SCIENTIFIC AND INDUSTRIAL POLICY

### FRG 1984-87 PLAN FOR COMPUTER-AIDED DESIGN, MANUFACTURING

Munich SUEDEUTSCHE ZEITUNG in German 23 Sep 83 p 32

[Unattributed article]

[Text] The federal government wants to assist industry for the next four years in producing computer-aided design and computer-aided manufacturing (CAD/CAM), by means of a funding program involving about 530 million DM. The program which was decided upon on Wednesday by the Federal Cabinet designated Federal Minister Heinz Riesenhuber as an assistant to the self-aid program of the manufacturing industry. The target group of the funding is primarily medium industry. According to the opinion of the federal government, this industry can no longer remain internationally competitive in wide areas without using the CAD/CAM technology.

The Bonn funding program will be started on 1 January 1984 and runs until the end of 1987. It consists essentially of three parts: 1. Of indirect-specific funding of the manufacturing industry; 2. funding of certain associated projects, and 3. various activities in the matters of technology transfer and technology spin-off estimates. With its concept of indirect-specific funding, the federal government deliberately does not want to influence directly the development and introduction of particular manufacturing technology. Government aid is therefore limited exclusively to the funding of basic development work in an enterprise which would like to apply the CAD/CAM technology. Both in computer-aided planning, development, and design (CAD), as well as in the computer-aided control of the manufacturing process, the material flow, and stocks (CAM), certain minimum requirements are specified for the data processing systems.

If these criteria are fulfilled, funding extends into the area of personnel costs, costs for external consulting, employee training, research and development contracts, and costs of technological procurement. In specific terms, this means: The CAD/CAM program of the Federal Ministry for Research and Technology (BMFT) covers 40 percent of the above-mentioned applicable expenditures, where the maximum amount is limited to 400,000 DM per enterprise. This would correspond to a total volume of 1 million DM for the initial introduction of a CAD/CAM system. A magnitude which the Federal Research Ministry has designated as the average experiential value for entry into this new technology. The funding is addressed to all legally independent enterprises of the investment-goods industry, which develop, manufacture, and market equipment for production, machinery, and equipment for use in the processing trades.

Government support for the development of industrial robots and handling systems forms the second focal point of the indirect-specific funding of CAD/CAM. Only systems which deal with at least three freely programmable axes and which are intended exclusively for industrial use are here fundable. The development of peripheral equipment, which is associated with industrial robots and other handling systems directly for certain functions, also falls under the funding. Within the framework of this program section, allocations will be granted in the amount of 40 percent of personnel costs, for external consultation, and for material and purchase price. The maximum funding per enterprise, however, will be 800,000 DM. A cumulative subsidy in the framework of both program sections is not possible.

#### Supervening solutions

The CAD/CAM program of the federal government is rounded out by means of associated projects which are supposed to solve cooperatively certain questions from important areas of manufacturing technology, questions which transcend particular businesses and which are oriented toward the future. The results of basic research here should also be converted to industrial application in a project-oriented manner. The funding is here primarily addressed to production enterprises, software houses, and research institutes, for which the principles of novel project funding apply.

Finally, different projects for technology spin-off estimates should be funded with the goal of determining the presuppositions and consequences of the use of modern manufacturing technologies and the associated future requirements for qualifications and work.

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## SCIENTIFIC AND INDUSTRIAL POLICY

### HEAD OF BULL ON STRATEGY, FUNDING, INDUSTRIAL INTERRELATIONS

Paris LIBERATION in French 4 Oct 83 p 11

/Interview with Francis Lorentz, general manager of Bull, by Jeanne Villeneuve and Jean-Marc Conin; date and place not specified/

/Text/ Francis Lorentz (Bull): "The administration has understood what is at stake." The general manager of the data processing company Bull, nationalized since 1981, explained the group's strategy to LIBERATION and declared that they were ready to talk with the new conglomerate, CGE-Thomson.

At Bull's inception, there was the Gallic desire to establish a powerful and independent data processing industry in France. A simple idea which in practice has proved to be particularly difficult to carry out. The size of the amounts to be invested in the development of a French computer was one of the difficulties encountered by the group--but it was not the only one. The undertaking apparently excited too many people: civil servants, officials, leaders, shareholders who in turn had their own ideas on the strategy which Bull should adopt. The history of the firm is an uninterrupted series of changes in shareholders, strategy, and range.

Today, Bull is nationalized and managed by a new team of men, Jacques Stern, president, and Francis Lorentz, general manager, and at the beginning of the year signed its draft contract defining its strategy and objectives. Everything seems to be ready for the conglomerate to get off to a new start under clearer conditions than in the past.

Since the beginning of the year, however, a few unforeseen incidents have arisen to disturb its situation again. First of all, the state as shareholder required the company to take over two new companies: Sens (microcomputers) bought from Thomson, and Transac (office automation) bought from CGE.

Later there was the period under the tutelage of the PTT /postal and communications service/ and therefore of the DGT (general telecommunications office) in June, then the marriage of Thomson and CGE in the telephone sector.

Lastly, the ultimate unforeseen event, although perhaps not so very unpredictable: the austerity of the 1984 budget which, coinciding with enormous needs among

groups which are less dynamic but in a more desperate situation (iron and steel for example), risks limiting once again the financial effort that would enable Bull to make a fresh start from a solid basis.

LIBERATION asked Francis Lorentz, general manager of the Bull group, how the group interpreted these recent changes.

/Question/ How do you view your relations with the general trend in telecommunications?

/Answer/ We have to show our new questioners that we have understood that for us it was a major undertaking to have a strong position in their domain. Not directly, but in being closely linked with the telecommunications industry, not in 6 months perhaps but in 2 or 3 years. In the second half of the decade, a computer manufacturer who lacked very strong ties with the telecommunications industry would be terribly isolated. That is plain.

The tendency is towards network integration of all that includes digital data processing (voice--pictures--data). Telecommunications and computer networks will in the future be completely integrated.

Large computers are all very well, they are essential; but the widespread use of computers in office automation, networks, and computer communications is just as essential today. Conversely, our questioners have to understand, and I know they do, that unlike the telecommunications industry which in France and abroad is oriented towards the big institutional buyers' market, we are and will be aiming more and more at a virtual consumers' market undergoing extraordinary change.

The standard will not simply be of a technical nature but will have to satisfy the constantly changing and rather capricious desires of the users. These users will be more and more demanding because of the proliferation of products on the market and because of fierce competition. The only law I know of for Bull--and I would say that it was a departure for us, bearing in mind our past practices of calculation and design--is really to answer continually to the demands and needs of the customer.

/Question/ What are you going to do about CGE after its agreement with Thomson in the telephone sector?

/Answer/ We need to have an understanding with those in the private telephone industry. Moreover, we have been well aware of this since we have been working for several months on the analysis of a large number of French and foreign appliances. We came to the conclusion that there are things to be done abroad but that a high degree of competence is also to be found in France. Not exclusively at CGE and Thomson, since there are five or six automatic switch manufacturers in France. That is a lot of people. Our concern was to call on each one of them and to say: "This is what we would like to do, what do you suggest? Let us see if we can work together." From there, agreements can be purely commercial or can go further, with technical cooperation agreements. All possibilities are open to consideration.



As far as the Thomson-CGE agreements are concerned, we do not have sufficiently precise information about them to form an opinion. Certainly CGE seems to be becoming more definitely a competitor in the office automation and business communication market. But let us be clear; when we took over Transac 9 months ago, we clearly accepted that there would be competition. There is no question of our seeking a sort of monopoly in office automation in France. That is absurd. I may add that the real challenge is on the international level. France can very well manage with having several companies. There is room for firms of very different types. Bull can find its place very well and the competition does not bother us.

On the other hand, if it turned out that the heart of the private telephone industry was in the hands of someone who was our direct competitor, that would require thinking through. But the administration has asked CGE to talk with us, so I assume that nothing is fixed.

/Question/ Is anything gained by inviting two manufacturers to hold talks?

/Answer/ I do not acknowledge defeat in anything. I believe talks are always necessary. There is no reason why we cannot work together. On condition that terms and rules of the game can be found which do not subject us to the actions of our competitor or force us to take the position he cares to leave us. If one wants a company's personnel to be mobilized, to strive to obtain their objectives, if one wants that company to succeed, it must be given the means of winning. This, I think, is what the minister of industry asked. It is in this sense that we will hold discussions.

/Question/ The electronic network, an industrial trend recently reaffirmed by the government as a priority, is to benefit from very substantial amounts. How much have you received this year from the state and how much will you receive in 1984?

/Answer/ For this year, except for FR 10 million, we will have received Fr 1.5 billion assimilable to our own funds, i.e., Fr 700 million in capital and Fr 800 million in loans. The latter sum is the setoff against the share exchange operation for Bull convertible bonds. In addition, we will have research sales for a total of over Fr 200 million I hope, following a research and development effort for the group, in the order of Fr 1,200 million in 1983.

/Question/ Have you paid for Sems and Transac? How much?

/Answer/ Yes, the figures were determined by an adjudicator appointed with the approval of the administration.

/Question/ A large sum?

/Answer/ In one case, at least, yes.

/Question/ Altogether, you did not receive very much in 1983 from your shareholder (the state)?

/Answer/ It was much and not very much at the same time. It did not amount to much by comparison with the arrears accumulated from the past. By the end of 1982, CII-HB found itself with zero in capital and more than 5 billion in financial debts. In the course of the preceding 5 years, only 3 million in capital had been invested in an industry which absorbs 1 franc of investment for every franc of additional turnover. It is a heavy industry. It is an enterprise which has doubled its turnover between 1977 and 1982. Four billion in additional turnover correspond to 4 billion in investments in different forms. During the same period, the ploughing back of profits collapsed, following the IBM price announcements in 1979, the technical problems encountered with the DPS7\* (now resolved), and above all the permanent change in strategy, personnel, and shareholders. All this reshuffling since 1977 (CGE-Saint-Gobin; Saint-Gobin and the involvement with Olivetti, then nationalization, renegotiation with the participation of Honeywell) has been very unsettling to put it mildly. The result everyone knows. By the end of 1982, there was more than 5 billion in debt and zero in capital. So there is a lot of adjustment to the past to be made. We have to stabilize.

According to our business plan, the main elements of this adjustment and restabilization effort should unfold in 1983 and 1984. Afterwards a very marked decline in capital needs should be observable, these needs corresponding to the normal accompaniment of a growth in enterprises.

/Question/ Have you received the amounts which you were asking for in the framework of this plan?

/Answer/ We may be able to tell you that at the end of next year. What was asked for was itemized year by year but there was still a 2 year hinge period. Over these 2 years, I was told, the bulk of the adjustment effort must be made. Afterwards, the following years will deal with far more modest amounts. I would say then, speaking in overall terms, that we will be able to evaluate these 2 years only at the end of 1984. Over this year, the 1.5 billion, even if it is divided into the Fr 700 and 800 million I referred to, is still not too bad. The amounts are equal to what is at stake.

However, over 2 years, it is plain that if the reductions effected in relation to what was planned were carried through, there would be a problem. But we have no cause for concern. The recent measures tend to bolster our position.

On the other hand, it is a good restraint from the financial point of view. It induces us to look more closely at certain strategies like the microcomputer strategy. All things considered, we do not feel ourselves to be completely satisfied, and that is normal. The problems have not been solved in a perfect way. But taking into account the difficulty of the times, the replies they gave us show that the administration has understood what is at stake. And that is the main thing.

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\*DPS7: a microcomputer.

## SCIENTIFIC AND INDUSTRIAL POLICY

### SIEMENS PROMOTES, INVESTS IN VENTURE CAPITAL

Duesseldorf WIRTSCHAFTSWOCHE in German 7 Oct 83 pp 180-181

#### /Unattributed Article/

/Text/ The entry of the largest German electrical conglomerate gives hope to the venture capital business for domestic major investors. At the same time, international perspectives open up.

On Monday of this week, the German supporters of the venture capital idea lost their biggest scapegoat: A top address, up to now often vilified as an example of the abstinence of major industry, banks, and insurance companies, came out of hiding as an ardent venture capital promoter and major investor: the Siemens AG.

Whenever, during the past month, talk drifted to the 0.1 percent rule for major institutional investors, which was invented by the Cologne foundation consultant Klaus Nathusius, it was easy for thoughts to turn to the approximately 11 billion marks which the electrical concern had in its coffers. The Siemens financial manager Heribald Nürger constantly had to hear about why he did not invest 0.1 percent of this, not into fixed-interest securities, but rather into young, growth-oriented technological enterprises. Especially since this would involve an easily borne risk for the world enterprise on the one hand, and a powerful shot for the economically important pioneers on the other hand.

Since Monday, such criticism has been misdirected. The Siemens technical manager Karl-Heinz Beckurts is a member of the board of a newly founded Techno Venture Management Company in Munich. There Siemens also represents the Nürger-Emissary Jochen Mackenrodt - as representative of the Chairman of the Board, of the American Peter A. Brooke, Chairman of the Boston Venture Capital Company T. A. Associates. The business management initially involves three people. Besides Rolf C. Dienst and Hellmut Kirchner of the independent TRV Accounting and Management Company GmbH, Peter Kaleschke from the share management of the electrical concern is also a member.

The financial powerful Siemens AG has engaged itself as a double-venture capital locomotive:

Through the 100 percent subsidiary Venture Capital Investment Company, it has a 25 percent share in the new risk management company. According to the American prototype (Wirtschaftswoche 10/1983), it is supposed to invest funds from powerful institutional investors, such as large industrial businesses, insurance companies, or pension funds, in technologically attractive youthful enterprises with above-average growth chances - including those in the Federal Republic. The investments will emphasize the electronics area - from components through data and communications technology up to medical devices - as well as biotechnology and bioelectronics.

At the same time, Siemens, as the main investor of the anticipated 130 million marks, will furnish 20 million marks for the first venture capital fund that has been started by Techno Venture - barely 0.2 percent of the liquid means of the electrical concern, and twice the Nathusius figure. The remainder will be divided among 20 other major investors, primarily German industrial enterprises, for example from the electrical and chemical area, but also foreigners who want to keep open a window to German top technologies.

For the Venture management, whose selection of investments and entrepreneurial management will be decisive concerning success or failure, Siemens has joined itself with "the best partners which we could find after extensive observation and contacts." Each of the following holds 25 percent of the fund management Techno Venture: T. A. Associates, for 15 years the leading US venture capital house, which today manages more than a billion marks, converted into investment volume; TRV, a branch of the Matuschka group, which is active internationally as a capital management company in the widest sense.

The latter has for several years been investing venture capital, not least of all from German origin, in the USA and Great Britain, at the present time about 300 million marks. In this area, it collaborates with TA and with Advent Management in London which is associated with TA, and which is engaged in Techno Venture only as a 5-percent shareholder. Twenty percent are reserved for the Techno business management, which has a corresponding share in the management fees - in the USA about 3 percent, which are obtained from interim assets. They also participate in the success of the investment.

For T. A. and TRV, Siemens is the German dream partner. The electrical concern with its research potential and its worldwide marketing experience can help to estimate the economic chances of the innovations being financed. And it has the capability of promoting the pioneering enterprises by cooperation in technology and marketing. True to the philosophy of the worldwide Advent Association which has been built up by T. A. Chef Brooke, Techno Venture wants to make specific technological transfers and foreign market contacts on an international basis. For this reason, only half of the Techno Venture pool will be put into German newcomers, the remaining half predominantly will be invested in the USA and to a lesser extent also in Japan.

About 70 million marks will remain in the country, this puts the Munich people still ahead of the banking subsidiary, the German Venture Capital Company mbH (WFG), which was founded in 1975, and which has available a capital of 50 million



marks. The Capital and Value Association for brokering private financial investment e.G. in Mainz, who up to now specialized in real estate, would like to finger its members for 20 million marks to be used for the recently set-up Innovation Value Fund 1.

Despite his own Venture Fund project, consultant Nathusius welcomes the appearance of the new competitor: "With its US engagement for major investors, TRV has contributed towards opening up markets and the Siemens participation has a pace-setting effect in the emulation of other major German industries."

WFG business manager, Karl-Heinz Fanselow, rather prophesies a struggle about the "few qualified founders". But, due to the wire to their house banks, and due to the fear of the little ones before the goliath Siemens, he is counting on good chances.

The TRV man Kirchner is protective about the electrical concern: "With its venture engagement, Siemens is being wholly capitalistic, it only wants to earn money." The fund was chosen as a solution - on the basis of their own experience and on the basis of experience in the USA with direct investments - "not to repress the youthful enterprises," according to the Siemens manager. "If Siemens were to try to inject itself directly into a portfolio enterprise or to procure advantages at the expense of co-investors, the project would render a very poor service," so emphasizes Kirchner. "To prevent this, and to assure a fair equalization, is the task of the Venture business management, which is subject to special secrecy obligations in order to protect the youthful enterprises."

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## TECHNOLOGY TRANSFER

### SWEDEN TAKES MEASURES TO CHECK INDUSTRIAL ESPIONAGE

Stockholm NY TEKNIK in Swedish 22 Sep 83 pp 4-5

[Article by Christer Larsson]

[Text] Security Police Tightening Controls on Technicians

Next month the ability of the security police to supervise the increasingly important group of technicians holding key positions in private industry will be improved.

On 1 October a new personnel supervision provision will go into effect which will allow the security police to go deeper in their investigations of people handling secret material and information.

The background for this is the reports of clearly increased intelligence activity directed against Sweden, as SAPO [Security Police] chief Sven-Ake Hjalmarth pointed out in the last issue of NY TEKNIK (No 37, 1983).

This espionage is traditionally aimed at defense, but it is increasingly being aimed at industry and research laboratories as well, according to Sven-Ake Hjalmarth.

In some instances, private industrial espionage has been backed by state intelligence organs.

"The step between civilian and military technology is not large," said Sven-Ake Hjalmarth.

For this reason the government is now supporting SAPO's interest in certain key groups of Swedish technicians who are in possession of large amounts of secret information. At the same time the extent of SAPO's personnel supervision will be reduced. Today they supervise well over 20,000 people.

"This involves a substantial reduction," said Undersecretary Harald Falth of the Ministry of Justice.

But he refused to be more precise.

"I cannot give any figures."

How many are involved today?

"Fewer than people generally think. There are those who think that all of us are under surveillance. That is by no means true."

But SAPO also has more obligations under the new personnel supervision regulation. For the first time SAPO will now be forced to turn over excerpts from its files to those being supervised. This must be done if someone gets a job in a so-called security classification and thus comes under SAPO's personnel supervision. New checks are to be made at least every fifth year and more frequently in some sensitive positions.

The idea is that if there are any errors in the files, they should be corrected.

"Every once in a while the government puts more emphasis on this kind of thing," said Undersecretary Harald Falth.

"But there are exceptions to this right.

"A person suspected of espionage who is under surveillance for that reason cannot be told about everything," said Harald Falth. "But he will be informed of other matters."

Is that something the security police are for or against?

"The only objection they have made is that they will be forced to send a lot of secret papers around the country."

Does he think that the criticism of personnel checks has been met halfway?

"Yes, it has. When I came here a few years ago, I felt that a lot of this activity was hocus pocus. Now we are seeing that it does not have to be so intricate."

Does that mean there is no room for discretion when it comes to personnel checks?

"No, there is no longer room for discretion. But as I said, there is now a chance for those being supervised to find out what is in their files unless that would be harmful to police activities, in which case the Secrecy Act applies. Then the information cannot be released.

"This is a sensitive activity which must be under the spotlight at all times.

"We also have a different and more aware leadership for SAPO and the National Police Board now than we had 10 or 15 years ago."

### **Some 20,000 Swedes in SAPO Files**

Over 20,000 Swedes are listed in security police files for occupational reasons. One of the key groups in this file represents technicians and scientists in that part of private industry that works in defense.

Around 400 private Swedish businesses and 58 state businesses and agencies are also included in the security police files. They all have access to secret information and material.

On 1 October of this year new personnel supervision provisions will go into effect that will regulate these files.

The information that over 20,000 Swedes are supervised by the security police comes from sources within the military security service.

The information that personnel working for 400 private firms that work in defense are under supervision by the security police comes from the security division of the Defense Materiel Command, FMV.

"Around 1,500 Swedish firms in all work in defense," they said at FMV. Of these, workers at 400 are checked by SAPO.

FMV makes defense purchases and thus knows which people working for private firms come in contact with secret material and information.

There is no point in presenting a list of which firms are being supervised, according to the defense staff security section. There is a steady turnover of firms that build and deliver items to the armed forces.

But there is a list of the state firms and agencies in which some key people who work with secret information are under supervision. The list comes from the Ministry of Justice and now includes 58 different bodies.

In practice there are considerably more, since the list puts all the government ministries under the same heading and OB [Supreme Commander of the Armed Forces] represents the armed forces branches, the Defense Research Institute, the Defense Radio Institute, the Defense Materiel Command and several separate authorities, each covering several thousand employees.

Here is the list, with these qualifications:

- FFV [Swedish National Defense Manufacturer] business department
- Public Surveillance Co.
- Industrial Safety Board
- National Labor Market Board
- Emergency Committee for Psychological Defense
- Building Board
- Civil officials

Civil Defense Board  
 Data Inspectorate  
 Computer Center for Administrative Data Processing  
 Ministries  
 Court system  
 Export Credit Commission  
 Aerotechnical Research Institute  
 Defense Rationalization Institute  
 General Customs Agency  
 Attorney General  
 Commerce Collegium  
 National Prisons Board  
 Agricultural Board  
 Aviation Agency  
 County government boards  
 Postal Agency  
 Riksdag's Administrative Office  
 Riksdag departments  
 National Social Insurance Board  
 National General Accounting Board  
 Chief Public Prosecutor  
 Shipping Board  
 National Social Welfare Board  
 Explosives Inspectorate  
 State Employers' Board  
 State Bacteriological Laboratory  
 State Energy Board  
 State Negotiation Council  
 State Immigration Board  
 State Agricultural Commission  
 State Railways  
 State Nuclear Power Inspectorate  
 State Board of Farm Measurements  
 State Foodstuffs Board  
 State Wages and Pensions Board  
 State Radiation Protection Institute  
 Bureau of Central Statistics  
 State offices  
 Swedish International Development Authority (SIDA)  
 Swedish Geological Survey  
 Swedish Meteorological and Hydrological Institute  
 Swedish Radio, Inc.  
 Telecommunications Agency  
 Transportation Council  
 Waterfall Agency  
 Highway Agency  
 Supreme Commander of the Armed Forces  
 National Board of Economic Defense

## Security Classifications

There are three so-called security classifications that will apply in Sweden after 1 October of this year. The number of people covered by these classification levels is a secret.

When it comes to the two highest classification levels, the government will determine which jobs should be included.

The government can delegate to various authorities the ability to make decisions concerning the lowest classification level.

With regard to private defense industries, the Supreme Commander of the Armed Forces will decide which jobs should be assigned to the various security classifications.

Security Classification IA includes employees who have a great deal of access to classified information of special importance to national security which concerns a large or especially important part of total defense.

Security Classification IB covers employees who have fairly wide access to classified information of special importance to national security.

Security Classification 2 covers employees who either have limited access to classified information of special importance to national security or have broader access to other secret information of special importance to national security.

## Engineer Accepts Security Checks

Jan Tufvesson is a civil engineer and division chief for aviation electronics at Ericsson Radio Systems and falls under the security classification provision. His job is of "importance to the national security," as the official classification defines it. He is checked at least every 5 years by the security police.

"I accept the fact that the Swedish security service supervises me since I work with military materiel," said Jan Tufvesson.

Jan Tufvesson is not alone. A large number of technicians and scientists in the defense industry are supervised regularly by the security police and the security organs of their own companies.

"I used to work for the Defense Materiel Command, FMV. There I was put in the highest security classification which meant the most supervision. I knew that.

"I assume that I have a security classification now as well. But no one has said anything and I have not asked about it.



"It does not make any difference. I have never noticed anyone checking on me. I have never felt that they were keeping an eye on me. But it would surprise me if they were not.

"I accept the fact that they check up on me because I work with military materiel such as the JAS airplane project."

[Question] Have you ever thought about how these checks are made?

[Answer] No, but I can think of several things. They could look in computer files, in criminal records. I do not know of all the records that may exist.

They can figure out whether I spend more money than I can afford. They can look at what I am insured for and at my assets. They can form a picture of the family's living standard and see if it matches our income. Have I any unsuspected income on the side?

I assume that the security service keeps an eye on certain sensitive organizations in Sweden. I think they observe which people move in those circles.

[Question] Do you think they listen to your telephone calls?

[Answer] I don't think so. I have not given that much thought.

[Question] But if you think about it now?

[Answer] I do not like the idea of being listened to. But I do not believe that a sensible person engaged in something underhanded would talk over the phone about sensitive matters.

I have never felt that I was under observation, even though I understand that this may have happened and could still be going on. Perhaps I am insensitive or perhaps the security service does the job discreetly.

The way in which checks are made on us is another thing. Checks can be made in more or less offensive ways.

[Question] What do you mean by offensive?

[Answer] That I have to answer charges and accusations made about me personally. They should not come with pure slander.

I have actually tried to find out which checks were made on me, but I have received evasive answers.

[Question] How far would you yourself be willing to go in checking on technicians in key positions in defense industries?

[Answer] Some records are already in existence. One can see what they contain about certain people. But give us a chance to counter direct errors.

But I have my doubts anyway. If one wants to harm Sweden by selling one's own bit to a foreign country, one would probably be careful not to draw attention to oneself. By not spending more than one earns. By not belonging to the wrong party. By not attending all the embassy receptions. Then one would probably not show up in the files.

But I think someone like that would give himself away in the long run if he was not the person he pretended to be.

[Question] Have you ever talked to your family about it?

[Answer] My wife knows that I work with sensitive information and that I was under a security classification at FMV. Now I am not even sure which classification I am included in.

[Question] You mentioned embassy receptions. How many invitations of that sort have you received?

[Answer] Definitely 20 or so during the time I was with FMV. I accepted about half of them.

[Question] Why did you turn down the rest?

[Answer] Sometimes I had other things to do. Sometimes I did not want to go for other reasons. Because I did not want to associate with those particular groups of people.

Here at Ericsson I have not had to make this kind of decision. So far.

[Question] Did you ever feel that someone was more than usually interested in you at any foreign embassy?

[Answer] Never.

[Question] If you had been subject to foreign surveillance, would you have told me?

[Answer] I would at least have told my security chief in order to get instructions on how to act.

[Question] More and more information today is gathered in the hands of fewer and fewer people. Does that mean that these key people will have to get used to being under an increasing amount of supervision? Where will all this end?

[Answer] We will never get away from increased responsibility leading to demands for increased reliability and for supervision. That may involve only a tiny fraction of the population. But I am opposed to the general tendency in Sweden today for the authorities to step in and supervise everyone.

We are moving in the direction of a Big Brother society. I believe that this trend will continue.

This will not make anyone feel good.

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## TECHNOLOGY TRANSFER

### FINNISH BUSINESSMEN, SECURITY CHIEF ON INDUSTRIAL SPYING

Helsinki HELSINGIN SANOMAT in Finnish 2 Oct 83 p 10

[Article by Martti Backman: "Finland Is the Promised Land of Industrial Spies; Firms Are Naive and Trusting, Laws Outmoded"]

[Text] "Industrial spying is at present one of Finnish firms' biggest causes for concern," Turku risk consultant Pentti Laurila asserted. The danger of industrial spying is the kind of risk that produces the most work for Riskienhallinta Oy [Risk Control Company], which is headed by Laurila.

So far the Turku firm of Riskienhallinta Oy is Finland's only risk control consulting company. It makes analyses of risks that threaten businesses and designs solutions by means of which risks are economically controlled.

The company provides aid in four risk domains: internationalization and industrialization risks, legal risks, new technology risks and information risks. The last-mentioned group includes automatic data processing risks and industrial spying risks.

"Since we got automatic data processing risks under control, industrial espionage has provided the most work for us," the firm's general manager, Pentti Laurila, told us.

Laurila is not claiming that industrial espionage has increased to the same extent. It is, however, a fact that firms have become alarmed over the possibility of information leaks since industrial espionage cases: Kemira, Dumell, Hitachi-IBM, etc., which have aroused attention, were revealed to the public.

Firms usually do not turn to Riskienhallinta Oy until the damage has already occurred, that is, when valuable information on the firm has been leaked.

During its nearly 3 years of operation Riskienhallinta has come across about 10 cases of industrial espionage that were carried out.

#### New Production Chief Was a Disappointment

In Laurila's experience industrial spies are interested in the most diverse kinds of information and skills. Data on finished products and their manufacture as well as product development secrets are always valuable.

Laurila told us about a company in Central Finland that not very long ago thought it had pulled off a real coup when it succeeded in hiring a product development chief who had been working for a competitor.

To the disappointment of the company directors, the new creative staff member did not after all appear to be accomplishing anything at all. When after a year of lack of enterprise they took the man to task over the matter, he immediately admitted that he had prepared himself to work with the firm at the behest of his former employer.

The man went back to his old firm and it was not very long before that firm put a line of models on the market that exactly matched the products developed with great effort by its competitor.

Price data and bids, particularly in big public project competitive bidding, are also much-desired commodities. The Siemens case that is now before the courts includes this sort of industrial espionage.

Riskienhallinta Oy was called on for help by a firm in Southeast Finland with a sales volume of about 20 million markkas. The firm's business was based on daily price quotations. At the firm they noticed that its toughest leading competitor on the market could anticipate its bids with amazing accuracy and come up with the winning bid.

#### Manager's Mail Diverted to Competitor

When the matter was investigated, they noticed that the company general manager's mail had been arriving a couple of days late. The delay was due to the fact that the mail was diverted to the firm's competitor, where it was held up to the light and read. The same thing happened to the outgoing mail. The competitor had bribed the person responsible for distributing the company's mail.

Laurila cited experiences with difficulties relating to the launching of operations at a new industrial plant as being a third kind of secret that attracts competitors. It can take as much as a half a year to get the wheels in motion at a big plant. Information as to how that time can be shortened is worth money.

Besides automatic data processing crimes, computer program thefts also include industrial espionage. Four of the 15 automatic data processing crimes investigated by the Central Criminal Police in Finland have involved the stealing of programs. It is estimated that as much as 60 percent of the programs used by American firms are entirely or in part stolen.

Laurila estimates that 9 times out of 10 a company gains knowledge of the secrets it desires by buying a so-called key person in the competitor firm. Alternatively, they may place their own man in the competitor firm "as a Trojan horse."



In the remaining cases information is procured in other ways, even by bugging. Laurila, however, maintains that an industrial spy does not need state-of-the-art electronic equipment in Finland. "Information is obtained otherwise, often simply by walking into a factory."

#### Sweden Denied Them Admission, Finland Received Them

Laurila said: "Some time ago a delegation of Japanese industrialists tried to make a familiarization tour of Sweden. Not a single Swedish firm consented to admitting them to their production plants. After that, the Japanese set their sights on Finland via our embassy, with the result that they were joyfully received here everywhere."

Laurila could not say anything about the extent of electronic spying. "At least people's fear of it is great. We have visited the offices of an awful lot of top managers looking for concealed microphones, bugs, but we haven't yet found a single one," Laurila said.

At one place where Riskienhallinta Oy search devices were on loan, they reported that there was probably a listening device in one office. It was not, however, found as a result of the search.

The Helsinki detective agency, APENTTIKO [expansion unknown], reports having uncovered four cases of bugging, two in Helsinki, one in Tampere and one in Joensuu.

A flea-sized concealed microphone that runs for 3 months and a transmitter cost \$700. When bought in lots of 1,000, the price drops dramatically. Over 100,000 of these are scattered throughout U.S. markets.

#### Spy Devices from a Duty-Free Shop

Laurila showed us a secret listening device a fourth the size of a matchbox which can be heard at a distance of 100 meters with an ordinary FM radio. One of these can be bought for 50 marks at Frankfurt Airport.

"Everlasting" transmitters that can be hooked up to telephone microphones can also be obtained in Frankfurt. In Stockholm too, there is a well-equipped spy device shop, owned by a Finnish businessman, which among other things sells auto telephone listening devices and miniature tape recorders that can be activated by voice.

Laurila has developed a four-phase program to combat industrial espionage. First it has to be determined whether there is company information which might interest competitors.

After this survey many company managers will be able to sleep in peace nights since it is estimated that only a fifth of the firms in Finland have information that would attract competitors.

Most of these operate in new fields in which the profits are large, more rarely in old fields whose protection has already been eroded by competition. Forty percent of Swedish firms report that they possess knowledge that is classifiable as secret.

The second phase is an investigation into employees' backgrounds. Among other things, this includes surveys of those employees who even in theory might divulge valuable information.

#### "New Employees' Backgrounds Must Be Investigated"

"When hiring new employees, investigation of their backgrounds is particularly important. The minimal requirement is that the hiring of a competitor's agent be avoided," Laurila insisted.

In the world at large they even try to determine this by using lie detectors. Machines can be rented in Finland too for this purpose, not, of course, from Riskienhallinta Oy.

The third phase consists of making employees aware of the risk of industrial espionage. Laurila recommends the organizing of information sessions for employees and security checks of plant facilities. "Employees should also be encouraged to grab strangers idly walking about more vigorously by the sleeve."

Keeping a man from being bought is perhaps the toughest job. But Laurila has a few tricks to do that too.

"Key employees must be tied to the company as closely as possible. For example, agreements in which they promise not to surrender any information, even if they change jobs, can be required of those who occupy sensitive positions."

Laurila admits that such agreements do not have much legal value. Experience, however, shows that moral ties also obligate Finns to comply with them.

Insurance for key personnel offered by insurance companies can be used as a sort of carrot on a stick. Then employee only receives the savings that thus accumulate after he has worked for the company a given number of years or goes into retirement.

#### Company Spying to Be Introduced into Criminal Law

Industrial espionage cases are rarely tried in court. Firms that have been duped most often suffer the consequences in silence.

The fact that industrial espionage is not sufficiently dealt with in the laws also dampens the desire to institute legal proceedings. Criminal law does not recognize such crimes. The unfair procurement and disclosure of commercial secrets is legally punishable only through laws governing improper practices in connection with business activities. Only the party who has suffered damages can bring suit, not the public prosecutor.

The present law describes the deed in general terms. For example, the courts have to consider whether a secret that has been confided to a pal over a glass of beer constitutes a crime, whether a party of employees granted permission to go on a tour of a plant may be guilty of spying or what the responsibility of a company's messengers and Xerox machine users is.

As for the police, they are confronted with fairly big investigative problems. Unlawful appropriation or disclosure of information is difficult to prove because they involve personal, confidential relations. The maximal penalty provided by law for such actions, 6 months in prison, is so mild that the police are not even authorized to impound the documents.

Working on the criminal law project, the Justice Ministry's Committee on Economic Crime has drafted special provisions governing company spying which are to be introduced into the criminal laws.

These would delineate three different kinds of acts. An individual from outside the firm could be guilty of actual company spying. The disclosure of company secrets would be called a crime by an employee of the firm. An outsider who gains possession of secrets would, on the other hand, be guilty of misappropriation of company secrets.

"The goal is to define acts and the notion of company secrets as precisely as possible," said legal adviser Kauko Huttunen, who is drafting the revision. In his opinion, the punishment scale for these acts should also be raised to more than what it is now.

The provisions governing company spying will be included in the first partial proposal for revision of the criminal laws, which the Justice Ministry plans to issue next spring.

Security Police Chief Seppo Tiitinen: Illegal Procurement of Information Has Not Increased

The Security Police have also noticed an increase in concern over industrial espionage in Finnish firms. They have not, however, been able to confirm an increase in illegal procurement of information that corresponds to this concern during the past couple of years.

According to the Swedish Security Police, industrial espionage engaged in by the countries of Eastern Europe has increased at an alarming rate. The same sort of expressions of concern over increasing Eastern bloc spy actions are also reaching us from other Western countries. Diplomats from the Soviet Union and its allies are repeatedly being expelled as spies.

Finnish Security Police chief Seppo Tiitinen did not want to comment on his foreign colleagues' cries of alarm. "We in Finland have not noticed any qualitative or quantitative change in illegal procurement of information," he asserted.

Tiitinen regards companies' growing concern over industrial espionage as a positive phenomenon in itself, "although there is no reason for painting shocking pictures of it or for hysteria." Awareness of the problem is leading them to taking precautions against it in a proper way.

The concept of industrial espionage represents many different kinds of activities. By it is meant, on the one hand, actual spying organized by the intelligence services of different nations, in an extreme sense having strategic importance in the procurement of top technology.

On the other hand, rivalry between domestic firms, ferreting out the secrets of one's competitors and copying models are also referred to as industrial espionage.

"Industrial espionage is only of interest to the Security Police if it is associated with a significant leak of information from the standpoint of the nation's external security of economic interests," Tiitinen thus explained the boundary between purely commercial and "political" spying.

Thus, for the Security Police to interfere with spying engaged in by a private foreign firm in Finland, there must be a danger of its resulting in significant damage to our security policy or the national economy. The Security Police do not take on the more modest information thefts; they are left for the ordinary Criminal Police to investigate.

According to Tiitinen, in many espionage cases the jeopardization of both economic and security policy interests is combined.

Economic espionage may be aimed at information on purely Finnish products and research data in addition to information purchased abroad. So-called embargo conditions pose a problem. These specify that Finland will get given technical information, industrial components and equipment only on condition that they are not passed on to third countries.

"Finland's economic interests are endangered if elsewhere in the world they get the impression that Finland is incapable of keeping such information under its control," Tiitinen explained. "Such leaks may also weaken Finland's foreign relations."

Preventive guidance and advisory activities are at present the Security Police's chief methods of operation. Assistance is provided on request, but the Security Police may also on its own initiative approach a firm it feels is operating in a risk sector. Security Police advisers annually visit nearly 100 firms and offices.

Tiitinen describes his philosophy of action as follows: "When we are able to comprehensively and effectively prevent industrial espionage, we also have to more conclusively than before weed out those cases that have already occurred and which have caused damage."



The Security Police's job is to nip these damaging actions in the bud, not to wait for a crime to be committed. "A case that has to be brought to court is from our standpoint already at least in part a failure."

According to Tiitinen, the electronic spying of the world of James Bond is not noticeable in Finland. According to him, effective industrial espionage is still based on people. Most often a spy tries to get his hands on secrets through the people who work for the firm.

The spies the Security Police are after do not usually listen in on conversations engaged in by company managers in offices. What goes on in managers' offices is of more interest in connection with competitive spying between firms.

"Documents containing precise information and broader, comprehensive views of affairs instead of competitors' secrets are of interest to the spy who poses a threat to national security," Tiitinen said.

To be sure, he admitted that Security Police agents have also stumbled onto electronic listening devices, but that is extremely rare. "Effective, classical spying is still conducted through people."

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